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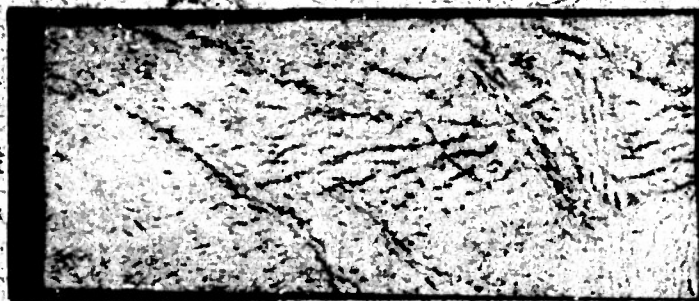
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VARIAN ENGINEERING  
REPORT NO. 132-9

COPY NO. 3

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## PROGRESS REPORT

REFINEMENT AND PRODUCTION OF 1000 RUGGED

X-BAND LOCAL OSCILLATOR V-52 KLYSTRONS

For Period: 1 March to 31 March 1953

Prepared for

Bureau of Ships

Navy Department


on


BuShips Contract NObs-5358

Prepared by:

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Approved by:

  
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Vice-Pres. and Gen. Manager

  
Sigurd F. Varian  
Vice-Pres. for Engineering

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JULY 1953

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## PURPOSE

The purpose of the program engaged under BuShips Contract NObs-5358 is to refine and produce one thousand (1000) rugged ~~X~~-band local oscillator V-52 klystrons. This tube is to comply with the specifications of SHIPS E-720, which were subsequently modified at a conference held at the Bureau of Ordnance, Washington, D.C. on 20-21 May 1952 and later at a conference held at Varian Associates on 29-30 September 1952.

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## PROGRESS

During March emphasis was placed on the completion of prototype production tubes of two types. The first tube type utilized the same parts as used in tubes already in production, except that a drawn steel flange was brazed to the body to provide for proper seating of the mica window. This construction served to replace a large number of machined parts with punch-press parts and to provide a flange that could be brazed or soldered directly to the external cavity. Two tubes of this type were completed and submitted for tests. Both tubes were found to have excessive response to unwanted spurious modes and to be rather poorly compensated for ambient warm-up.

Development of the second type of prototype tube was also started this month. This tube was fabricated almost entirely of punch-press parts. The object of this construction was to utilize as many as possible of the standard parts manufactured in large quantities for metal receiving tubes. The body section proper remained a lathe-turned part with a simple milled slot for the iris, and the same drawn steel window flange was used as for the first prototype. It was planned to devise means for mounting the brazed cathode assembly on the molded glass stem used for metal receiving tubes, and to devise a similar type of stem mount for the reflector. Five tubes of this type were assembled ready for insertion of grids and mica windows when tests were completed on the first prototype. It then became obvious that the same difficulties with undesired modes and temperature compensation encountered in the first prototype tube would be met in the newer design. Because of these design problems, it was decided to shift this work to a developmental

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contract being negotiated, and concentrate on refining production techniques to produce the tube as it had been originally designed.

In this connection, no tubes of the original design were actually produced during this month. However, parts, such as the molybdenum drift tube, continued to be made. The drift tubes are being drawn from sheet stock rather than machined from solid rod, with very satisfactory results. The parts are uniform in dimensions, and the surface finish is considerably superior to that of machined parts. During March parts were drawn with improved quality and reduced shrinkage over the previous month's production.

Several pieces of equipment required for V-52 production were either constructed or ordered this month. A stem machine was built and placed in operation. Sample lots of stems were fabricated and minor modifications made to the machine for optimum performance.

Two electric ovens and recording process controllers were ordered from the Despatch Oven Company. The first of these ovens is for production annealing of cathode and reflector stems, and is designed to permit the use of a non-oxidizing atmosphere such as nitrogen or forming gas. The recording process controller ordered for this oven will provide both a carefully controlled annealing schedule and an individual record of each annealing cycle. The second electric oven is designed for use in curing the molded silastic bases on the tube. This oven, also ordered with a recording process controller, incorporates a timed exhaust system to provide for the external exhaust of the fumes that are liberated during the first few hours of the curing cycle.

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A set of design drawings was received from the Lindberg Engineering Company in connection with the hump-back conveyor furnace previously ordered. Upon examination of the drawings, minor modifications were requested by Varian to best meet our requirements. These were agreed to by the supplier, and delivery of the furnace was promised for May.

During March a new test equipment console was designed and built. This console was designed to include one complete set of production test equipment arranged to provide maximum efficiency and economy in test operations. Test equipment units previously received were incorporated, and the completed console was placed in operation.

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## PROGRAM FOR NEXT INTERVAL

Emphasis will be made during the next period to construct 200 V-52 tubes of the present design.

Estimated expenditures during March 1953: \$20,700.00

Estimated man-hours during March 1953: 1720

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